We claim:

1. An antibody multimer comprising at least a first and a second antigen binding fragment, wherein the at least first or second antigen binding fragment or both is capable of binding or cross-reacting with an epitope comprising the formula

$$[(W)_z - P - (Y)_t - P]_q \qquad \text{Formula (I)}$$

with $(S)_r$ attached to $(Y)_t$

Wherein:

W is any amino acid other than Aspartate and Glutamate

Y is any naturally occurring moiety that is capable of being sulfated

P is $(A)_m(A)_n(X)_u$ or $(X)_u(A)_n(A)_m$ or $(A)_n(X)_u(A)_m$ or $(A)_n(A)_m(X)_u$ or $(X)_u(A)_m(A)_n$ or $(A)_m(X)_u(A)_n$

S is sulfate or a sulfated molecule

X is any amino acid except Aspartate, Glutamate, or Tyrosine

A is any negatively charged amino acid or leucine, isoleucine, proline, phenylalanine, serine, or glycine

q is 1 to 6

z is 0, 1, or 2

r is 0 or 1

t is 1, 2 or 3

u is 0 to 2

n is 0 to 3

m is 0 to 3

wherein if n = 0 then m >0; wherein if m = 0 then n >0; wherein if q is 1, r is 1, and if q is >1 at least one of Y is sulfated.

2. An antibody multimer of claim 1 wherein the first or second antigen binding fragment or both binds or cross reacts with the epitope in which:

W is Glycine,

Y is a peptido conjugate of Tyrosine or a glyco conjugate of sparagine, Serine or Threonine.

A is Glutamate, γ Carboxy Glutamate or Aspartate

q is 1, 2, or 3.

3. An antibody multimer of claim 1 wherein the first or second antigen binding fragment or both binds or cross reacts with the epitope in which:

Y is a peptido conjugate of Tyrosine

q is 3

r is 1.

4. An antibody multimer comprising at least a first and second antigen binding fragment, wherein the first or second antigen binding fragment or both is capable of binding or cross-reacting with an epitope comprising the formula

$$(W)_z - P - (Y)_r - P - (Y)_t - P - (Y)_t - P$$

with $(S)_r$ attached to each $(Y)_r$ and each $(Y)_t$ — Formula II

Wherein:

W is any amino acid other than Aspartate and Glutamate

Y is any naturally occurring moiety that is capable of being sulfated

P is $(A)_m(A)_n(X)_u$ or $(X)_u(A)_n(A)_m$ or $(A)_n(X)_u(A)_m$

or $(A)_n(A)_m(X)_u$ or $(X)_u(A)_m(A)_n$ or $(A)_m(X)_u(A)_n$

S is a sulfate or a sulfated molecule

X is any amino acid except Aspartate, Glutamate or Tyrosine

A is any negatively charged amino acid or leucine, isoleucine,

proline, phenylalanine, serine, or glycine

z is 0, 1, or 2

r is 0 or 1

t is 1, 2 or 3

u is 0 to 2

n is 0 to 3

m is 0 to 3

wherein if n =0 then m > 0; wherein if m = 0 then n > 0; wherein at least one Y is sulfated.

5. An antibody multimer of claim 4 wherein the first or second antigen binding fragment or both binds or cross reacts with the epitope in which:

W is Glycine

Y is a peptide conjugate of Tyrosine or a glyco conjugate of Asparagine, Serine or Threonine

A is Glutamate, γ Carboxy Glutamate or Aspartate, Leucine, Isoleucine, Proline, Phenylalanine, Serine, or Glycine.

6. An antibody multimer of claim 4 wherein the first or second antigen binding fragment or both binds or cross reacts with the epitope in which:

Y is a peptido conjugate of Tyrosine

q is 3; and

r is 1.

7. An antibody multimer comprising at least a first and second antigen binding fragment, wherein the at least first or second antigen binding fragment or both is capable of binding or cross-reacting with an epitope comprising the formula

$$(G)_z(X)_u(E)_n(D)_m(Y)_t(S)_r\,(X)_u(E)_n(D)_m(Y)_t(S)_r(X)_u(E)_n(D)_m(Y)_t(S)_r(D)_m(E)_n(X)_u$$ Formula III

Wherein:

G is Glycine

E is Glutamate

D is Aspartate

Y is Tyrosine

S is sulfate or a sulfated molecule

X is any amino acid except the above

z is 0, 1, or 2

t is 1, 2 or 3

r is 0 or 1

u is 0 to 2

n is 0 to 3

m is 0 to 3

wherein at least one Y is sulfated; wherein if n = 0 then m > 0; wherein if m = 0 then n > 0.

8. An antibody multimer of claim 7 wherein the first or second antigen binding fragment or both binds or cross reacts with the epitope in which r is 1.

9. An antibody multimer of claim 1, 4 or 7 wherein the multimer is a dimer, trimer or tetramer.

10. An antibody multimer of claim 9 wherein the multimer is a dimer.

11. A dimer of claim 10 wherein at least one of the first and second antigen binding fragments is selected from scFv fragments of Y1 and Y17.

12. A dimer of claim 10 wherein the first and second antigen binding fragments are linked by a disulfide bridge.

13. A dimer of claim 12 wherein the first and second antigen binding fragments are Y1-CysKAK.

14. A dimer of claim 10 wherein the first and second antigen binding fragments are linked by a polypeptide linker of 5 to 20 amino acids.

15. A dimer of claim 14 wherein the polypeptide linker comprises 5 amino acids.

16. A dimer of claim 15 wherein the polypeptide linker is $Gly_4Ser$.

17. An antibody multimer of claim 9 wherein the multimer is a trimer.

18. A trimer of claim 17 comprising three antigen binding fragments, wherein at least one of the antigen binding fragments is a Y1 scFv fragment or Y17 scFv fragment.

19. A trimer of claim 18 wherein the antigen binding fragments are linked by a polypeptide linker.

20. A trimer of claim 19 wherein the polypeptide linker comprises 1 to 5 amino acids.

21. An antibody multimer of claim 9 wherein the multimer is a tetramer.

22. A tetramer of claim 21 comprising four antigen binding fragments, wherein at least one of the antigen binding fragments is a Y1 scFv fragment or Y17 scFv fragment.

23. A tetramer of claim 22 wherein the antigen binding fragments are linked by a polypeptide linker.

24. A tetramer of claim 23 wherein the polypeptide linker comprises 1 to 5 amino acids.

25. A tetramer of claim 21 wherein the four antigen binding fragments form a complex through streptavidin-biotin association.

26. An antibody multimer of claim 9 comprising identical antigen binding fragments.

27. An antibody multimer of claim 9 wherein the at least first or second antigen binding fragment or both comprises a first hypervariable region comprising SEQ ID NO: 8.

28. An antibody multimer of claim 9 wherein the at least first or second antigen binding fragment or both comprises a first hypervariable region comprising SEQ ID NO:20.

29. An antibody multimer of claim 27 or 28 wherein the at least first or second antigen binding fragment or both has a second hypervariable region comprising SEQ ID NO: 115 and/ or a third hypervariable region comprising SEQ ID NO: 114.

30. An antibody multimer of any one of claims 1, 4, 7, 27 and 28 wherein the multimer is capable of binding to at least two different molecules selected from the group consisting of PSGL-1, fibrinogen gamma prime (γ'), GP1bα, heparin, lumican, complement compound 4 (CC4), interalpha inhibitor, and prothrombin.

31. An antibody multimer of any one of claims 1, 4, 7, 27 and 28 wherein the multimer is capable of binding to at least two different molecules selected from the group consisting of PSGL-1, fibrinogen gamma prime (γ'), GP1bα, heparin, lumican, complement compound 4 (CC4), interalpha inhibitor, and prothrombin and is capable of binding to at least one cell type selected from the group consisting of B-CLL cells, AML cells, multiple myeloma cells, and metastatic cells.

32. An antibody dimer comprising a first and second antigen binding fragment, wherein said first or second antigen binding fragment or both comprises a hypervariable region comprising the amino acid sequence of SEQ ID NO: 8 [Y1 CDR3].

33. An antibody dimer comprising a first and second antigen binding fragment, wherein said first or second antigen binding fragment or both comprise a hypervariable region comprising the amino acid sequence of SEQ ID NO: 20 [Y17 CDR3].

34. An antibody dimer of claim 32 or 33, wherein said first or second antigen binding fragment or both further comprises a second hypervariable region comprising the amino acid sequence of SEQ ID NO:115 and/or a third hypervariable region comprising SEQ ID NO: 114.

35. An antibody multimer comprising a first and second antigen binding fragment, wherein said first or second antigen binding fragment or both is capable of cross-reacting with two or more epitopes, each epitope comprising one or more sulfated tyrosine residues and at least one cluster of two or more acidic amino acids.

36. An antibody multimer of claim 35 wherein said multimer is capable of cross-reacting with PSGL-1.

37. An antibody multimer of claim 35 that binds to QATEYEYLDYDFLPETE wherein at least one tyrosine residue is sulfated.

38. An antibody multimer of claim 35 wherein the multimer is capable of cross-reacting with GP1b-α.

39. An antibody multimer of claim 35 that binds to DEGDTDLYDYYPEEDTEGD wherein at least one tyrosine residue is sulfated.

40. An antibody multimer of claim 35 that binds to TDLYDYYPEEDTE wherein at least one tyrosine residue is sulfated.

41. An antibody multimer of claim 35 that binds to DEGDTDLYDYYP wherein at least one tyrosine residue is sulfated.

42. An antibody multimer of claim 35 that binds to to YDYYPEE wherein at least one tyrosine residue is sulfated.

43. An antibody multimer of claim 35 that binds to to TDLYDYYP wherein at least one tyrosine residue is sulfated.

44. An antibody multimer of claim 35 wherein the multimer is capable of cross-reacting with fibrinogen gamma prime.

45. An antibody multimer of claim 44 that binds to EPHAETEYDSLYPED wherein at least one tyrosine residue is sulfated.

46. An antibody multimer of claim 35 wherein the multimer is capable of cross-reacting with heparin.

47. An antibody multimer of claim 35 wherein the multimer is capable of cross-reacting with complement 4 (CC4).

48. An antibody multimer of claim 35 that is capable of cross-reacting with at least one cell selected from the group consisting of B-CLL cells, AML cells, multiple myeloma cells and metastatic cells.

49. A pharmaceutical composition comprising an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

50. A pharmaceutical composition of claim 49 comprising the antibody multimer in an effective amount to increase mortality of tumor cells or to increase the susceptibility of tumor cells to damage by an anti-cancer agent.

51. A pharmaceutical composition of claim 49 comprising the antibody multimer in an effective amount to inhibit growth and/or replication of leukemia cells.

52. A pharmaceutical composition of claim 49 comprising the antibody multimer in an effective amount to inhibit abnormal cell-cell, cell-matrix, platelet-matrix, platelet-platelet, and/or platelet-cell adhesion.

53. A pharmaceutical composition of claim 49 comprising the antibody multimer in an effective amount to increase the susceptibility of diseased cells to damage by anti-disease agents.

54. A pharmaceutical composition of claim 49 comprising the antibody multimer in an effective amount to increase the mortality of leukemia cells amount or to increase the susceptibility of leukemia cells to damage by anti-leukemia agents.

55. A pharmaceutical composition comprising an antibody multimer according to any one claims 1, 4, 7, 27 and 28 coupled to or complexed with an agent selected from the group consisting of anti-cancer, anti-metastasis, anti-leukemia, anti-disease, anti-adhesion, anti-thrombosis, anti-restenosis, anti-auto-immune, anti-aggregation, anti-bacterial, anti-viral, and anti-inflammatory agents.

56. A pharmaceutical composition of claim 55 wherein the agent is selected from the group consisting of toxins, radioisotopes and pharmaceutical agents.

57. A pharmaceutical composition of claim 55 wherein the agent is an anti-viral agent selected from the group consisting of acyclovir, ganciclovir and zidovudine.

58. A pharmaceutical composition of claim 55 wherein the agent is an anti-thrombosis/ anti- restenosis agent selected from the group consisting of cilostazol, dalteparin sodium, reviparin sodium, and aspirin.

59. A pharmaceutical composition of claim 55 wherein the agent is an anti-inflammatory agent selected from the group consisting of zaltoprofen, pranoprofen, droxicam, acetyl salicylic 17, diclofenac, ibuprofen, dexibuprofen, sulindac, naproxen, amtolmetin, celecoxib, indomethacin, rofecoxib, and nimesulid.

60. A pharmaceutical composition of claim 55 wherein the agent is an anti-autoimmune agent selected from the group consisting of leflunomide, denileukin diftitox, subreum, WinRho SDF, defibrotide, and cyclophosphamide.

61. A pharmaceutical composition of claim 55 wherein the agent is an anti-adhesion/anti-aggregation agent selected from the group consisiting of limaprost, clorcromene, and hyaluronic acid.

62. A pharmaceutical composition of claim 56 wherein the the radioisotope is selected from the group consisting of gamma-emitters, positron-emitters, x-ray emitters, beta-emitters, and alpha-emitters.

63. A pharmaceutical composition of claim 62 wherein the wherein the radioisotope is selected from the group consisting of $^{111}$indium, $^{113}$indium, $^{99m}$rhenium, $^{105}$rhenium, $^{101}$rhenium, $^{99m}$technetium, $^{121m}$tellurium, $^{122m}$tellurium, $^{125m}$telluriunm $^{165}$thulium, $^{167}$thulium $^{168}$thulium $^{123}$iodine, $^{126}$iodine, $^{131}$iodine, $^{133}$iodine, $^{81m}$krypton, $^{33}$xenon, $^{90}$yttrium, $^{213}$bismuth, $^{77}$bromine, $^{18}$fluorine, $^{95}$ruthenium, $^{97}$ruthenium, $^{103}$ruthenium, $^{105}$ruthenium, $^{107}$mercury, $^{203}$mercury, $^{67}$gallium and $^{68}$gallium.

64. A pharmaceutical composition of claim 56 wherein the pharmaceutical agent is selected from the group consisting of doxorubicin, methoxymorpholinyldoxorubicin (morpholinodoxorubicin), adriamycin, cis-platinum, taxol, calicheamicin, vincristine, cytarabine (Ara-C), cyclophosphamide, prednisone, daunorubicin, idarubicin, fludarabine, chlorambucil, interferon alpha, hydroxyurea, temozolomide, thalidomide and bleomycin, and derivatives and combinations thereof.

65. A pharmaceutical agent of claim 55 coupled to or complexed with a vehicle or carrier that is capable of being coupled or complexed to more than one agent.

66. A pharmaceutical composition of claim 65 wherein the vehicle or carrier is selected from the group consisting of dextan, lipophiolic polymers, HPMA and liposomes.

67. A pharmaceutical composition of claim 49 comprising the antibody multimer in an amount effective to inhibit cell rolling.

68. A pharmaceutical composition of claim 48 comprising the antibody multimer in an amount effective to inhibit inflammation.

69. A pharmaceutical composition of claim 48 comprising the antibody multimer in an amount effective to inhibit auto-immune disease.

70. A pharmaceutical composition of claim 48 comprising the antibody multimer in an amount effective to inhibit thrombosis.

71. A pharmaceutical composition of claim 48 comprising the antibody multimer in an amount effective to inhibit restenosis.

72. A pharmaceutical composition of claim 48 in an amount effective to inhibit metastasis.

73. A pharmaceutical composition of claim 48 comprising the antibody multimer in an amount effective to inhibit growth and/ or replication of tumor cells, increase mortality of tumor cells, or increase the susceptibility of tumor cells to damage by anti-cancer agents.

74. A pharmaceutical composition of claim 49 comprising the antibody multimer in an amount effective to inhibit growth and/ or replication of leukemia cells, increase the mortality rate of leukemia cells or increase the susceptibility of leukemia cells to damage by anti-leukemia agents.

75. A pharmaceutical composition of claim 49 comprising the antibody multimer in an amount effective to increase the susceptibility of diseased cells to damage by anti-disease agents.

76. A pharmaceutical composition of claim 49 comprising the antibody multimer in an amount effective to inhibit cell-cell, cell-matrix, platelet-matrix, platelet-platelet, and/ or cell-platelet aggregation, adhesion or complex formation.

77. A pharmaceutical composition of claim 49 coupled to or complexed with an agent selected from the group consisting of anti-cancer, anti-metastasis, anti-leukemia, anti-disease, anti-adhesion, anti-thrombosis, anti-restenosis,anti-autoimmune, anti-aggregation, anti-bacterial, anti-viral, and anti-inflammatory agents.

78. A pharmaceutical composition of claim 78 wherein the agent is an anti-viral agent selected from the group consisting of acyclovir, ganciclovir and zidovudine.

79. A pharmaceutical composition of claim 49 wherein the antibody multimer is coupled to or complexed with a vehicle or carrier that is capable of being coupled or complexed to more than one agent.

80. A pharmaceutical composition of claim 49 wherein the vehicle or carrier is selected from the group consisting of dextran, lipophilic polymers, HPMA, and liposomes.

81. A method of inhibiting cell rolling, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

82. A method of inhibiting inflammation, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

83. A method of inhibiting auto-immune disease, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

84. A method of inhibiting metastasis, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

85. A method of inhibiting thrombosis, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

86. A method of inhibiting restenosis, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

87. A method of inhibiting growth and/or replication of tumor cells or increasing the susceptibility of tumor cells to damage by anti-cancer agents, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

88. A method of inhibiting growth and/or replication of leukemia cells or increasing the susceptibility of leukemia cells to damage by anti-leukemia agents, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

89. A method of increasing the susceptibility of diseased cells to damage by anti-disease agents, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

90. A method of inhibiting cell-cell, cell-matrix, platelet-matrix, platelet-platelet, and/or cell-platelet complex formation, aggregation, or adhesion comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

91. A method of ameliorating the effects of disease, preventing disease, treating a disease or inhibiting the progress of a disease, comprising administering to a patient in need thereof a pharmaceutical composition comprising an effective amount of an antibody multimer according to any one of claims 1, 4, 7, 27 and 28.

92. A method of claim 91 wherein the antibody multimer is coupled to or complexed with an agent selected from the group consisting of anti-cancer, anti-metastasis, anti-leukemia, anti-disease, anti-adhesion, anti-thrombosis, anti-restenosis, anti-

autoimmune, anti-aggregation, anti-bacterial, anti-viral, and anti-inflammatory agents.

93. A method of claim 92 wherein the agent is an anti-viral agent selected from the group consisting of acyclovir, ganciclovir and zidovudine; an anti-thrombosis/ anti- restenosis agent selected from the group consisting of cilostazol, dalteparin sodium, reviparin sodium, and aspirin; an anti-inflammatory agent selected from the group consisting of zaltoprofen, pranoprofen, droxicam, acetyl salicylic 17, diclofenac, ibuprofen, dexibuprofen, sulindac, naproxen, amtolmetin, celecoxib, indomethacin, rofecoxib, and nimesulid; or an anti-autoimmune agent selected from the group consisting of leflunomide, denileukin diftitox, subreum, WinRho SDF, defibrotide, and cyclophosphamide; an anti-adhesion/anti-aggregation agent selected from the group consisiting of limaprost, clorcromene, and hyaluronic acid.

94. A method of claim 92, wherein the agent is selected from the group consisting of toxins, radioisotopes, and pharmaceutical agents.

95. A method of claim 94, wherein the pharmaceutical agent is selected from the group consisting of doxorubicin, methoxymorpholinyldoxorubicin (morpholinodoxorubicin), adriamycin, cis-platinum, taxol, calicheamicin, vincristine, cytarabine (Ara-C), cyclophosphamide, prednisone, daunorubicin, idarubicin, fludarabine, chlorambucil, interferon alpha, hydroxyurea, temozolomide, thalidomide and bleomycin, and derivatives and combinations thereof.

96. A method according to claim 92, wherein the antibody multimer is coupled to or complexed with a vehicle or carrier that is capable of being coupled or complexed to more than one agent.

97. A method according to claim 96, wherein the vehicle or carrier is selected from the group consisting of dextran, lipophilic polymers, HPMA, and liposomes.

98. A kit comprising at least one antibody multimar according to any one of claim 1, 4, 7, 27 and 28.